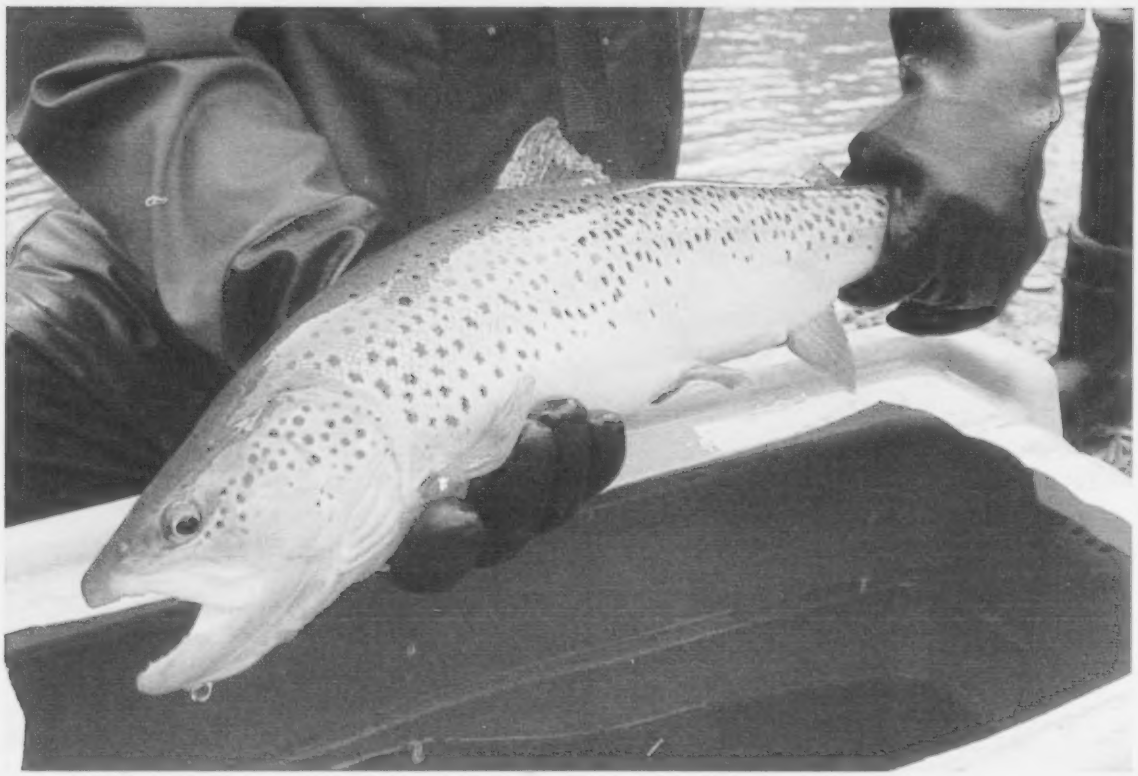
Whiteman's Creek Trout Density and Biomass Estimates, 2010



Southern Region, Guelph District
Technical Report

Ontario Ministry of Natural Resources

Whiteman's Creek Trout Density and Biomass Estimates, 2010

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Southern Region, Guelph District
Technical Report

December 2012

Ontario Ministry of Natural Resources

This technical report should be cited as follows: Timmerman, A.J. 2012. Whiteman's Creek Trout Density and Biomass Estimates, 2010. Ontario Ministry of Natural Resources, Guelph District. 31 p.

Printed in Ontario, Canada
MNR # 62751
ISBN # 978-1-4435-8252-0

Copies of this publication are available from:

Guelph District Office
Ontario Ministry of Natural Resources
1 Stone Road West
Guelph, Ontario
N1G 4Y2

All photos by Steve May

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Acknowledgements

I am indebted to David J. Reid and Jack Colonnello of the former Simcoe District office of the Ontario Ministry of Natural Resources (OMNR), John Waller and Henk Vandermeulen of the Brant Rod and Gun Club and Ola McNeil and Ken Cornelisse of the OMNR for helping me clearly chronicle the history of brown trout stocking in Whiteman's Creek.

Fortunately many of the staff who were involved in the early years of population and biomass sampling on Whiteman's Creek were able to reach into their memories to assist me in documenting the actual detailed methods used to generate the population estimates. I am grateful to Jim Bowlby, Larry Halyk, Jack Imhof and Warren Yerex.

This work simply would not have been possible without the assistance of numerous individuals from the Brant Rod and Gun Club, Trout Unlimited Canada, the Grand River Conservation Authority, Pure fishing Canada and the OMNR as well as a number of interested anglers and students. I thank:

Matt Alves
Nick Bezemer
Nolan Bomberry
Brie-Anne Breton
Ron Brooks
Gord Brown
Jim Brown
Barry Buckwold
Phil Clough
Ken Cornelisse
Mary Finch
Lyndsey Fletcher
Trevor Friesen
Larry Halyk
Chris Hockley
Kelly Kamo-McHugh
Mark MacDougall
Gillian Martin
Steve May
Larry McConkey
Larry Mellors
Devin Mills
Tom Nowlan
Colin Oaks
Radek Odolczyk
Lori Richardson
Terry Schwan
Mikala Schweyer
Leslie Smith
Jennifer Studiman
Nicole Thackeray
Nick Timmerman
Hank Vermeulen
Bill Whitehead
Rick Whorwood
Jay Wolek
Jennifer Wright
Tony Zammit

Jim Bowlby and Larry Halyk provided many helpful comments on an earlier draft of this report.

Executive Summary

In 2010 we estimated trout density and biomass at three lower Whiteman's Creek (Brant County) stations previously sampled between 1989 and 1998. Brown trout reproduced successfully in 2009 and 2010. Densities of YOY and age 1^+ brown trout were higher or at least comparable to years when stocking of brown trout fry occurred in 2001 and earlier.

The density of catchable brown trout was well below average at two of the three stations and the total catchable trout density has decreased since 1993. The evidence suggests that these declines may not be the result of angler harvest. However, mortality estimates calculated from two consecutive years of data would be required to verify that. Poor year-class strength, especially of the 2008 year-class (age 2^+ fish) may be a factor, as well as changes to the habitat at two of the stations.

Densities of YOY and age 1^+rainbow trout were very high indicating excellent reproduction in 2009 and 2010. These high numbers continue a trend which began in the 1980's. Rainbow trout make up a larger percentage of the YOY, age1^+ and catchable trout at the three stations compared to the 1989 to 1998 period.

1.0 Introduction

Whiteman's Creek is a tributary of the Grand River in Oxford and Brant Counties in southern Ontario. The lower approximately 35km of the creek in Burford and Brantford Townships in Brant County flows through the Norfolk Sand Plain where groundwater discharge increases summer baseflow and moderates water temperatures to support trout species. Normal summer baseflow (Environment Canada gauge 02GB008 at Mount Vernon: www.wateroffice.ec.gc.ca) is 1.1 m^3/s, GRCA).

Recently, questions have arisen regarding the present health of the brown trout *(Salmo trutta)* population in Whiteman's Creek, the level of natural reproduction, the historical contribution of the stocking of brown trout and the impact of an expanding rainbow trout *(Oncorhynchus mykiss)* population on brown trout. To attempt to answer these questions, in 2010 we estimated trout density and biomass at three creek stations previously sampled between 1989 and 1998.

1.1 History of Trout Management in Whiteman's Creek

Brown trout are native to Europe and western Asia and were first stocked in Ontario in 1913 and in Whiteman's Creek (Brant County) in 1914 (Lasenby and Kerr 2001). In 1914, 800 brown trout of an unknown life stage were stocked in Whiteman's Creek (Anonymous 1915) followed by an additional stocking in 1918 (Anonymous 1919). Between 1932 and 1959, brown trout fry and yearlings from the Mount Pleasant and Chatsworth hatcheries were stocked in Whiteman's Creek and its tributary, Landon's Creek (Appendix 1). The commercial culture of brown trout was discontinued in Ontario in 1961 due to disease concerns and a low return relative to the number stocked (Lasenby and Kerr 2001).

Prior to the 1940's lower Whiteman's Creek from the village of Burford to the Grand River was divided into sections by four mill dams (Robertson 1990). The establishment of a self sustaining brown trout population in the lower creek is thought to coincide with the destruction of a number of these small dams following a major flood in 1947 and Hurricane Hazel in 1954. According to Art Holder (former OMNR Regional Biologist who was stationed the Hespeler District in the 1950's) the removal of the dams allowed the habitat to improve enough to help the trout colonize Whiteman's Creek and maintain a small population without stocking. As early as 1965, there was evidence that brown trout were establishing self-sustaining populations in southern Ontario including in Whiteman's Creek (Gingrich 1965). In 1971 the local Conservation Officer and members of the Brant Rod and Gun Club reported that a self-maintaining brown trout fishery of moderate quality presently existed in the lower Whiteman's Creek (ODLF 1972). Ontario Ministry of Natural Resources (OMNR) files contain many accounts of brown trout observed spawning in the creek and of fish caught by angling and electrofishing in the 1970's and early 1980's.

In the early 1980's, OMNR staff felt that brown trout production in Whiteman's Creek and other streams impacted by sedimentation could be increased or at least maintained through the use of incubation boxes. One objective of this effort was to

prevent the extinction of local stocks by this means until habitat rehabilitation efforts to stop sedimentation succeed (Smith 1991). From 1983 to 1985 the OMNR and members of the Brant Rod and Gun Club collected eggs from local stock and incubated them in upwelling boxes. By 1986 eggs were being cultured in the Paul Helm Memorial Hatchery at the Brant Rod and Gun Club. The resulting swim up fry were stocked back into Whiteman's and Landon's Creeks. The stocking of brown trout fry in Whiteman's Creek and other creeks in the Norfolk Sand Plain was considered successful to varying degrees (Smith 1991). Brown trout fry were stocked annually from 1983 until 2001 when it was terminated (Appendix 1).

In 1988, one test and two control stations ranging from 630 to 900m in length were established as part of an experimental management study to determine if implementation of *Special Angling Regulations* was an effective means of protecting brown trout populations in Whiteman's Creek. Trout population and biomass estimates were determined using electrofishing and the Peterson mark-recapture method before, during and after the introduction of *Special Angling Regulations* in a section of the creek in 1990. These regulations consisted of:

- Limit of one trout per day
- Minimum size restriction 50 cm
- Artificial lures only: No live or organic bait
- Single barbless hook

From 1989 to 1994 trout population and biomass estimates were calculated for all three stations by the Simcoe and Guelph districts of the OMNR using the Peterson mark-recapture method and in 1995, estimates were determined for only the test and upstream control stations. In 1998, trout population estimates were again determined for the test and upstream control stations by the Lake Erie Management Unit of OMNR.

Although not native to Ontario, rainbow trout are also considered to be a naturalized species in Ontario waters. Rainbow trout were stocked in Whiteman's Creek from 1961 to 1981 (Appendix 2). In addition, rainbow trout were known to escape from fish farms adjacent to Landon's Creek and lower Whiteman's Creek (L. Halyk, pers. comm.). Although MacCrimmon and Gots (1972) did not include Whiteman's Creek in their list of steams containing migratory runs of rainbow trout, runs had been recorded in the Grand River nearly upstream to Brantford. Rainbow trout had been observed spawning downstream of the Lorne Dam in Brantford by 1972 (Sandilands 1972, The Expositor 1976).

They were first documented from the creek in 1979 during an anglers' survey when they constituted 30% of sport fish captured (Anonymous 1979). Fork lengths of rainbow trout sampled during a creel survey in 1980 ranged from 18 – 25 cm. During an outing in 1984, members of the Kitchener-Waterloo Flyfishers reported that "the big browns decided to play hard to get but the little browns and rainbows gave us some action" (Patterns 1984). A creel survey conducted in 1993 showed that 76% of the trout caught in the creek that year were rainbow trout compared to 23% - 35% during the 1988 to 1990 period.

The expansion of the rainbow trout population in Whiteman's Creek is the result of the deterioration and final removal of the Lorne Dam on the Grand River in Brantford.

This dam was showing signs of deterioration at least as early as 1982 and was removed in 1989. The dam was located approximately 12 km downstream of the mouth of Whiteman's Creek. More recently, the Five Oaks dam which was a partial barrier at the mouth of Whiteman's Creek was removed in the fall of 2007.

2.0 Methods

In 2010 electrofishing and mark-recapture followed methods used from 1989 to 1998.

2.1 Station Locations

A test station and two control stations in Brantford Township were sampled in 2010 (Figure 1). The test station and downstream and upstream control stations were established in 1988 and will be referred to as Rest Acres, Apps' Mill and Mill-Cleaver in this report. The Apps' Mill station is entirely within the *Special Angling Regulations* section of the creek. The start and end points of the stations electrofished from 1989 and 1998 were determined from information on file and identified in the field. Start and end points were always at shallow riffles. The Apps' Mill and Mill-Cleaver stations were shortened for the work conducted in 2010.

The UTM coordinates of these points was determined using a GPS and mid-channel station length was subsequently determined using a GIS with 2006 ortho-rectified digital aerial photos of the area. Mean stream width was calculated from measurements of stream width on August 30, 2010 at a discharge of 1.3 m^3/s near Mount Vernon. Spacing between width measurements was determined as station length/10 – 1 with the first measurement being at the start (downstream) point of the station (Stanfield 2005). Stations were 721 to 761m long (Table 1) and 0.75 to 2 km from each other.

2.2 Fish Collection Methodology

Electrofishing was conducted with a 2m fiberglass punt which held a 5 H.P. generator and a Smith-Root 2.5 G.P.P. electrofishing control box. Direct current was delivered to the water via two anodes on long cables at an output of 3 to 4 amps. The minimum crew consisted of nine people consisting of one person operating the control box and pushing the punt, two people operating the anodes, a minimum of four netters (two with each anode) and two people transferring fish from the netters to a large holding container on the punt. Additional crew, if available, were used to untangle anode cables from debris and substrate and to process fish.

Electrofishing was conducted from mid to late August (Table 1), as in previous years when stream discharge (Environment Canada gauge 02GB008 at Mount Vernon: www.wateroffice.ec.gc.ca) was near baseflow conditions (1.1 m^3/s, GRCA). Stream discharge, water temperature, and electrofishing effort were determined for each sampling date (Table 1). Electrofishing was always done in an upstream direction without the use of blocking nets. All habitats suitable for trout were shocked. In large, deep pools, a coordinated effort of the two anode operators was used to increase the

effectives of the gear. A conscious effort was made to capture all sizes of trout. Representatives of non-trout species were captured to compile a list of all fish species at each station.

2.3 Fish Processing

Trout captured during the mark run were identified to species, measured for total length (mm), and weighed (g) on a digital scale (from 1989 to 1994 fish were weighed using spring scales). Young-of-the-year (YOY) trout were determined by length and weighed in bulk. Trout were marked by removing a portion of the adipose fin or upper lobe of the caudal fin (for YOY) prior to being released. Fish were processed periodically and quickly to reduce stress on fish. Flow-through containers were placed in the stream to maintain oxygen levels for fish. After processing, all fish were released in suitable habitat already electrofished.

The recapture run was conducted eight days after the mark run. All trout were again identified to species and marked fish were noted. All yearling (1^+) and older fish were measured and weighed and YOY were tallied. Other species captured at each station were listed as in the mark run.

2.4 Density and Biomass Calculations

Population estimates were calculated separately for each age-size class of fish. Age-size classes had previously been determined in 1989 from length frequency tables. Age-size classes for brown trout were as follows:

Age	*Length Range (mm)*
0+	*0-129 mm*
1+	*130-249 mm*
2+	*250-374 mm*
3+	*375-499 mm*
≥4+	*>500 mm*

and for rainbow trout were:

Age	*Length Range (mm)*
0^+	*0-129 mm*
1^+	*130-249 mm*
2^+	*250-374 mm*
$\geq 3^+$	*375-499 mm*

Age-size classes were determined in 2010 from length frequency tables of all fish measured during the mark run, however, for consistency, all year to year population comparisons were made using the age-size classes established in 1989.

Population estimates were determined using the adjusted Petersen mark-recapture formula (Ricker 1975):

$$N = (M+1)(C+1)/(R+1)$$

where

N = Estimate of total population size
M = Total number of animals captured and marked on the first visit
C = Total number of animals captured on the second visit
R = Number of animals captured on the first visit that were then recaptured on the second visit

This method operates under four basic assumptions:

1. Closed population (no emigration or immigration)
2. No births or deaths
3. Marked and unmarked individuals mix randomly after the first capture
4. All individuals have an equal probability of capture (there are no differences in age, sex, size, etc.). Because this assumption was not valid across size groups, population estimates were size stratified.

Density (number/ha) for each age-size class of brown trout and rainbow trout was based on the estimated population and the area of each station. Biomass (kg/ha) was calculated as the product of density and the mean weight in each age-size class.

2.5 Some Caveats When Interpreting the Data

1991

Age 0^+ population densities of brown trout for the Rest Acres and Mill-Cleaver stations are imprecise because very few fish were captured during the recapture run, but nevertheless reflect the low magnitude of the population compared with later years.

1992

In 1992 only the mark run was completed due to high water conditions. However, since the size-specific catchability estimates from 1989 to 1991 and 1993 to 1994 were remarkably consistent across sites and years for both rainbow trout and brown trout, 1992 population estimates were salvaged using the catchability from the other years.

1995

The 1995 data have numerous problems. All 1^+ rainbow trout captured during the mark run were euthanized; therefore, there are only population estimates for brown trout. The file data included a **total** population estimate for brown trout; however, population estimates for the individual age-size classes of brown trout were not determined. As well, the data sheets for the recapture run did not indicate which of the recaptured fish had been previously marked or not. Therefore it was not possible to calculate population estimates for the various age-size classes. Weights were not determined; therefore it is not possible to calculate biomass. For the above reasons, estimates for 1995 have not been included for comparison.

1998

Population estimates were determined only for the Apps' Mill and Mill-Cleaver stations in 1998 and at those stations only estimates of age 1^+ brown trout and rainbow trout densities could be found in the file data. The densities of brown trout and especially age1^+ rainbow trout are exceptionally high and are highly suspect. We were not able to locate the original raw data. For the above reasons, estimates for 1998 have not been included for comparison.

2010

A number of pools at all stations were too wide and deep to be sampled effectively with the equipment. Although this was also the case during the sampling conducted between 1989 and 1998, the problem was much more significant in 2010. This was especially the case at the Apps' Mill and Mill-Cleaver stations, where an estimated 30% and 20% respectively of the surface area could not be effectively sampled. This would have the effect of reducing the precision of the estimate of 250^+ mm trout at all stations compared to previous years, but especially at the Apps' Mill station and Mill-Cleaver stations.

The catchability of 250^+ mm brown trout in 2010 was compared to the catchability in other years. Catchability was calculated as M/N where M is the total number of brown trout captured and marked on the mark run and N is the estimate of total population size. From 1989 to 1994 (except 1992) the catchability of brown trout averaged over the three stations was 0.68, 0.68 and 0.71 for age-size classes 2^+, 3^+ and 4^+ respectively. In 2010, the catchability was 0.52, 0.50 and 0.44 for the same age-size classes. Therefore the population estimates of 250^+ mm brown trout in 2010 are less precise than in previous years.

3.0 Results and Discussion

3.1 Brown Trout Density and Biomass Estimates

Five age-size classes were interpreted from length frequency tables compiled from brown trout captured during the mark run (Table 2). However, for consistency, all year to year population comparisons were made using the age-size classes established in 1989.

Differences in habitat can explain the variation in densities of the various age-size classes of brown trout amoung the three stations. YOY densities were above average at the Rest Acres and Mill-Cleaver stations and below average at the Apps' Mill station (Figures 2, 3, 4). The author and others involved in the sampling during the 1989 to 1994 period were of the opinion that habitat has changed significantly at the Apps' Mill station and may be the reason for the below average YOY density there. The results indicate excellent natural reproduction in 2010. Recall that brown trout YOY have not been stocked in Whiteman's Creek since 2001.

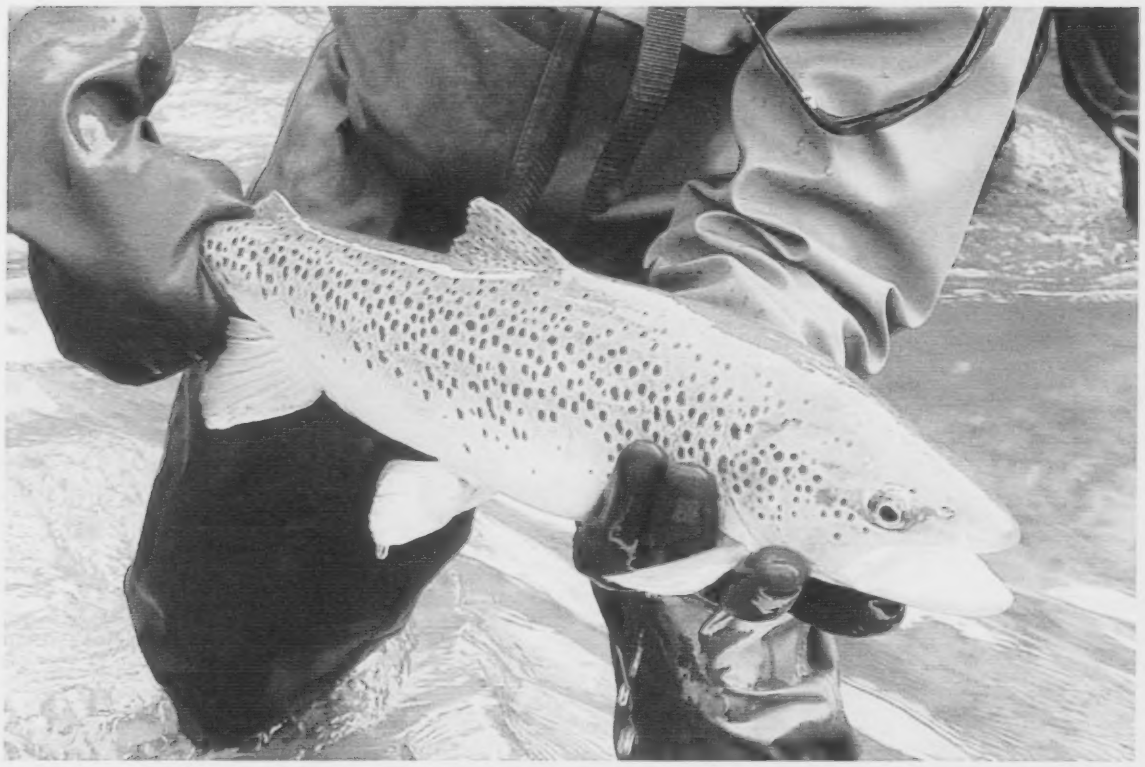
The density of age 1^+ brown trout was a record high at the Rest Acres station in 2010 suggesting good reproduction in 2009 (Figures 2, 3, 4). Age 1^+ densities were comparable to earlier years at the Apps' Mill station and below average at the Mill-Cleaver station.

"Catchable" brown trout are those which are over 250mm (10") in length and are generally fish that are 2 years old or older. The density of catchable brown trout at the Rest Acres station was comparable to the 1989 to 1994 period (Figure 5). In fact, the density of age 2^+ fish at this station was the highest ever recorded. However, the density of catchable brown trout was well below average at the Apps' Mill and Mill-Cleaver stations (Figures 6, 7). This is especially the case for age 2^+ fish.

Some anglers have reported a decline in catchable brown trout, however, it is uncertain if this is more perception than reality partly brought on by the huge increase in rainbow trout numbers. For anglers who have not learned to change their methods and presentations, the large number of rainbow trout in the system make it harder to catch brown trout in Whiteman's Creek now than in the past (L. Halyk, pers. comm.). Perhaps the tendency for small rainbows to rainbows to hold in more open water farther from cover makes them more vulnerable to anglers and has led many to believe that some of these streams are dominated by rainbows when the electrofishing data tells us otherwise (Bowlby and Stanfield 1998).

Interestingly, local anglers report that recent fishing pressure for brown trout in Whiteman's Creek is greatly reduced compared to earlier years. This suggests that a decline in catchable brown trout cannot be blamed on angler harvest. The low numbers of catchable brown trout at the Apps' Mill station where *Special Angling Regulations* have been in place since 1990 provides further support for this suggestion. Late winter high flow events and the extremely high sand bedload of Whiteman's Creek can result in poor brown trout year-class strength. This is a common problem with fall spawning species in flashy trout streams and is not a problem that rainbow trout have to deal with (White et. al. 1976). Poor year-class strength, especially of the 2008 year-class (age 2^+ fish) may be a factor, as well as changes to the habitat at two of the stations. Brown trout and rainbow trout in Whiteman's Creek can also be negatively affected by low flow

conditions resulting from severe drought and high irrigation demand for agriculture (Halyk 2012).



The biomass estimates of brown trout were compared amoung the stations in 2010 (Figure 8). The biomass of YOY, age 1^+ and age 2^+ fish was highest at the Rest Acres station while the biomass of 3^+ and older fish was highest at the Apps' Mill station. Catchable brown trout biomass was also highest at the Apps' Mill station.

The 2010 biomass estimates were not compared to those estimated in previous years for a number of reasons:

- for 1989 biomass estimates for brown trout were not available for the Mill-Cleaver station.
- for 1989 total biomass estimates of brown trout do not include age 0^+ for the Rest Acres and Apps' Mill stations.
- for 1990 total biomass estimate of brown trout does not include age 0^+.
- for 1992 and 1994, no biomass estimates were available
- for 1993, the total biomass estimate of brown trout does not include age 0^+ and 1^+ at the Apps' Mill and Mill-Cleaver stations.

For those years and age-size classes for which biomass estimates were available, the mean weight of the age-size classes differ greatly from the mean weights calculated in 2010 and are highly suspect. From 1989 to 1994 fish were weighed using spring scales.

3.2 Rainbow Trout Density and Biomass Estimates

Three age-size classes were interpreted from length frequency tables compiled from rainbow trout captured during the mark run (Table 3). However, for consistency, all year to year population comparisons were made using the age-size classes established in 1989.

As with brown trout, differences in habitat can explain the variation in densities of the various age-size classes of rainbow trout amoung the three stations. In 2010, YOY densities at all stations were the highest ever recorded (Figures 9, 10, 11), indicating excellent reproduction in 2010. These high numbers continue a trend which began in the 1980's. YOY rainbow trout density in Whiteman's Creek in 2010 compares well with about 40 randomly selected index sites on Lake Ontario tributaries, and would sit in the middle with the Ganaraska River (J. Bowlby, pers. comm.). Whiteman's Creek has excellent conditions for rainbow trout reproduction because early spring floods flush fine sediments from spawning gravel and the pre-emergent incubation period is very short (weeks) compared to brown trout (months). The Lake Ontario sites with higher density are smaller streams which inherently have higher YOY salmonid density.

Age 1^+ density at Rest Acres was the highest ever recorded and at App's Mill and Mill-Cleaver it was the second highest ever recorded suggesting good reproduction in 2009 as well (Figures 9, 10, 11).

Densities of "catchable" rainbow trout (age 2 and older, over 250mm (10")) were the highest ever recorded at the Rest Acres and Mill-Cleaver stations (Figures 12, 14). As well, the highest densities of fish over 375mm (14.8") were recorded at all stations in 2010 (Figure 12, 13, 14). Rainbow trout up to 458mm (18"), 499mm (19.6") and 462mm (18.2") were captured at the Rest Acres, Apps' Mill and Mill-Cleaver stations respectively. During the last 15 years, a resident rainbow population has become established on the Grand River between Paris and Brantford and some of these fish are now migrating during summer into Whiteman's Creek (L. Halyk, pers. comm.), perhaps to avoid higher temperature. The removal of the Five Oaks dam at the mouth of Whiteman's Creek in 2007 increased the ability for thermally stressed rainbow trout to enter the cooler waters of Whiteman's Creek.

The biomass estimates of rainbow trout were compared amoung the stations in 2010 (Figure 15). The biomass of YOY and age 2^+ and older fish was highest at the Rest Acres station and the biomass of age 1^+ fish was highest at the Mill-Cleaver station.

The 2010 biomass estimates were not compared to those estimated in previous years for a number of reasons:

- for 1989, 1990, 1992 and 1994, biomass estimates for brown trout were not available.
- for 1993 no biomass estimate is available for yearlings at the Rest Acres station, for YOY at the Apps' Mill station and YOY and YRLG at the Mill-Cleaver station.

For those years and age-size classes for which biomass estimates were available, the mean weight of the age-size classes differ greatly from the mean weights calculated in 2010 and are highly suspect. From 1989 to 1994 fish were weighed using spring scales.

3.3 Brook Trout Population and Biomass Estimates

Brook trout *(Salvelinus fontinalis)* were the native trout species that occupied Whiteman's Creek before deforestation and the creation of mill dams altered the habitat of the creek and largely eliminated them. Brook trout were also stocked in the creek between 1947 and 1980. No brook trout were captured in 2010 Up to four brook trout per year were captured during trout population and biomass surveys between 1983 and 1994.

3.4 Total Trout Population and Biomass Estimates

Total YOY brown trout and rainbow trout densities have increased in Whiteman's creek starting in 1992 (Figure 16). There appears to be no negative effect on brown trout YOY from the increase in rainbow trout YOY. Similarly, total age 1^{+} trout density has increased since 1993 and since 1994, the density of age 1^{+} rainbow trout has been higher

than that of brown trout (Figure 17). However, the total catchable trout density has decreased since 1993 and rainbow trout made up 39% of the catchable trout in 2010 (Figure 18).

Bowlby and Stanfield (1998) found that in many Lake Ontario tributaries, browns and rainbows coexist where flows are stable, groundwater inflow is high and forests along the banks contribute to an excess of log cover. Where the habitat quality is suitable for browns, they coexist with rainbows but as habitat quality for browns declines, they are the first species to go. Adding rainbows to a stream with browns may not necessarily reduce the brown trout population, depending on if the brown trout population is at capacity and on the type of habitat. The biggest competitive impact by rainbows may be on minnows, who's decline may marginally reduce growth rates of larger brown trout that would be forced to feed on more invertebrates or rainbow trout.

Brown trout predation on rainbow trout was documented in 2010 in Whiteman's Creek.

3.5 Non-Trout Species

Data on non-trout fish species captured during previous population and biomass assessments are available only for the years 1983 to 1987. Johnny darters *(Etheostoma nigrum)* were reported in 1983 to 1987 but not in 2010. Rainbow darters *(Etheostoma caeruleum)* were very abundant at all stations in 2010, however, only one was reported from 1983 to 1987.

Several species were captured in 2010 that were not reported previously (Table 4). Greenside darters *(Etheostoma blennioides)* were captured at all stations in 2010 but not reported from 1983 to 1987. Since the early 1990's, there has been a significant increase in the greenside darter's range and abundance within southwestern Ontario. The impact of the addition of this species to the fish community in Whiteman's Creek is unknown. Mottled sculpins *(Cottus bairdi)* were captured in small localized sections of the Apps' Mill and Mill-Cleaver stations in 2010, however, only one individual was reported from all three stations between 1983 and 1987.

3.6 Fin Clipped Brown Trout

One brown trout (T.L. 475mm, Wt. 1154g) captured at the Apps' Mill station had a complete adipose fin clip when captured, indicating it had been stocked. Based on the clip and Table 2, this fish was either an age 1^{+} fish stocked in 2003 in the Grand River tailwater upstream of West Montrose or in Mill Creek in Soper Park in Cambridge or an adult fish stocked in, the Conestogo River tailwater upstream of Hawkesville between 2003 and 2005. Given that ~ 21,000 adipose clipped brown trout were released into the Grand River tailwater compared to ~ 1000 in Mill Creek and ~ 1000 in the Conestogo River tasilwater, it is most likely that this fish came from the Grand River. A second adipose-clipped brown trout was captured, however, the length and weight data associated with that fish has been lost.

4.0 Conclusions

Brown trout reproduce successfully in Whiteman's Creek though spawning success is likely variable due to abiotic factors affecting survival to emergence. Densities of YOY and age 1^+ brown trout in 2010 were higher or at least comparable to years when stocking of brown trout fry occurred in 2001 and earlier.

The density of catchable brown trout was well below average at the Apps' Mill and Mill-Cleaver station and the total catchable trout density has decreased since 1993. Some of the evidence suggests that these declines may not be the result of angler harvest. However, mortality estimates calculated from two consecutive years of data would be required to verify that. Poor year-class strength, especially of the 2008 year-class (age 2^+ fish) may be a factor, as well as changes to the habitat at two of the stations.

The trend of increasing numbers of rainbow trout continued in 2010. A progressively larger percentage of YOY, age 1^+ and catchable trout are rainbow trout and the density of catchable rainbow trout is increasing.

5.0 References

Anonymous. 1915. Eighth Annual Report of the Game and Fisheries Department of Ontario. 1914. Toronto, Ontario.

Anonymous. 1919. Twelfth Annual Report of the Game and Fisheries Department of Ontario. 1918. Toronto, Ontario.

Anonymous. 1933. Twenty-Sixth Annual Report of the Games and Fisheries Department of Ontario. 1932. Toronto, Ontario.

Anonymous. 1934. Twenty-Seventh Annual Report of the Games and Fisheries Department of Ontario. 1933. Toronto, Ontario.

Anonymous. 1935. Twenty-Eighth Annual Report of the Games and Fisheries Department of Ontario. 1934. Toronto, Ontario.

Anonymous. 1937. Twenty-Ninth Annual Report of the Games and Fisheries Department of Ontario. 1935 – 1936. Toronto, Ontario.

Anonymous. 1938. Thirtieth Annual Report of the Games and Fisheries Department of Ontario. 1936 – 1937. Toronto, Ontario.

Anonymous. 1939. Thirty-First Annual Report of the Games and Fisheries Department of Ontario. 1937 – 1938. Toronto, Ontario.

Anonymous. 1940. Thirty-Second Annual Report of the Games and Fisheries Department of Ontario. 1938 – 1939. Toronto, Ontario.

Anonymous. 1940. Thirty-Third Annual Report of the Games and Fisheries Department of Ontario. 1939 – 1940. Toronto, Ontario.

Anonymous. 1942. Thirty-Fourth Annual Report of the Games and Fisheries Department of Ontario. 1940 – 1941. Toronto, Ontario.

Anonymous. 1943. Thirty-Fifth Annual Report of the Games and Fisheries Department of Ontario. 1941 – 1942. Toronto, Ontario.

Anonymous. 1944. Thirty-Sixth Annual Report of the Games and Fisheries Department of Ontario. 1942 – 1943. Toronto, Ontario.

Anonymous. 1945. Thirty-Seventh Annual Report of the Games and Fisheries Department of Ontario. 1943 – 1944. Toronto, Ontario.

Anonymous. 1946. Thirty-Eighth Annual Report of the Games and Fisheries Department of Ontario. 1944 – 1945. Toronto, Ontario.

Anonymous. 1948. Thirty-Ninth Annual Report of the Games and Fisheries Department of Ontario. 1945 – 1946. Toronto, Ontario.

Anonymous. 1979. Summary of Data for the 1979 Whiteman's Creek Fisheries Survey. Ontario Ministry of Natural Resources and Telephone City Angling Club. OMNR Cambridge District. File report. 8p.

Bowlby, J. and L. Stanfield. 1998. Salmonine interactions in Lake Ontario tributaries. Lake Ontario Assessment Internal Report LOA 98.10. 3 p.

Dreyer, E.K.E. 1960. Fish distribution 1959. Lake Huron District, Ontario Department of Lands and Forests. 6p.

Gingrich, H.J. 1965. Brown Trout Report. Lake Huron District, Ontario Department of Lands and Forests. 8p.

Halyk, L. 2012. Note to OMNR file: Low water reconnaissance of Whiteman's Creek, summer 2012. Ontario Ministry of Natural Resources, Guelph District. 20p.

Lasenby, T.A. and S.J. Kerr. 2001. Brown trout stocking: An annotated bibliography and literature review. Fish and Wildlife Branch. Ontario Ministry of Natural Resources. Peterborough, Ontario. 187 p + appendices.

MacCrimmon, Hugh R. and B.L. Gots. 1972. Rainbow Trout in the Great Lakes. Ontario Ministry of Natural Resources. Sport Fish Branch. 66p.

Ontario Department of Lands and Forests. 1972. A reassessment of the proposed dam and reservoir lower Whiteman's Creek. Lake Huron District, Hespeler. 38p

Patterns. 1984. The official publication of the Kitchener-Waterloo Flyfishers. Vol. 2, issue 11. December 1984. pg. 3

Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada Bulletin 191.

Robertson, Mel. 1990. A Look at Fishing in Years Gone By, Burford, Ontario. The Burford Times. June 13, 1990.

Sandilands, A.P. 1972. 1971 Fish Report For the Grand River Valley. Grand River Conservation Authority. 26p + appendices.

Smith, N.W. 1991. Fish stocking in the southwestern region, 1974 – 1989: An historical review and rationalization. Ontario Ministry of Natural Resources, London, Ontario. 80p.

Stanfield, L. (Ed.). 2005. Ontario Stream Assessment Protocol. Version 7. Ontario Ministry of Natural Resources. Aquatic Research and Development Section. 276p.

The Expositor. 1976. Sea lampreys return to Grand. June 16, 1976. pg. 22.

White, R.J., E.A. Hansen and G.R. Alexander. 1976. Relationship of trout abundance to stream flow in Midwestern streams. Proceedings of the Symposium on Instream Flow Needs. American Fisheries Society 1976. Vol. II. 657pp.

Figure 1. Whiteman's Creek Trout Population and Biomass Stations, 2010

Ontario

Legend

Population and Biomass Station

Limits of Special Regulations Area

1 = 20,000

0 330

meters

Produced by:
Invasmanor,
Guelph District Office,
Ontario Ministry of Natural Resources,
1 Stone Rd W, Guelph, ON N1G 4Y2

Produced on: October 07, 2011

Projection: UTM Zone 17N
Datum: NAD 1983 (phereid: GRS_1980)
Filename: Whitemans Biomass 2010

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This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Natural Resources (OMNR) shall not be liable in any way for the use of, or reliance upon, this map or any information on this map.

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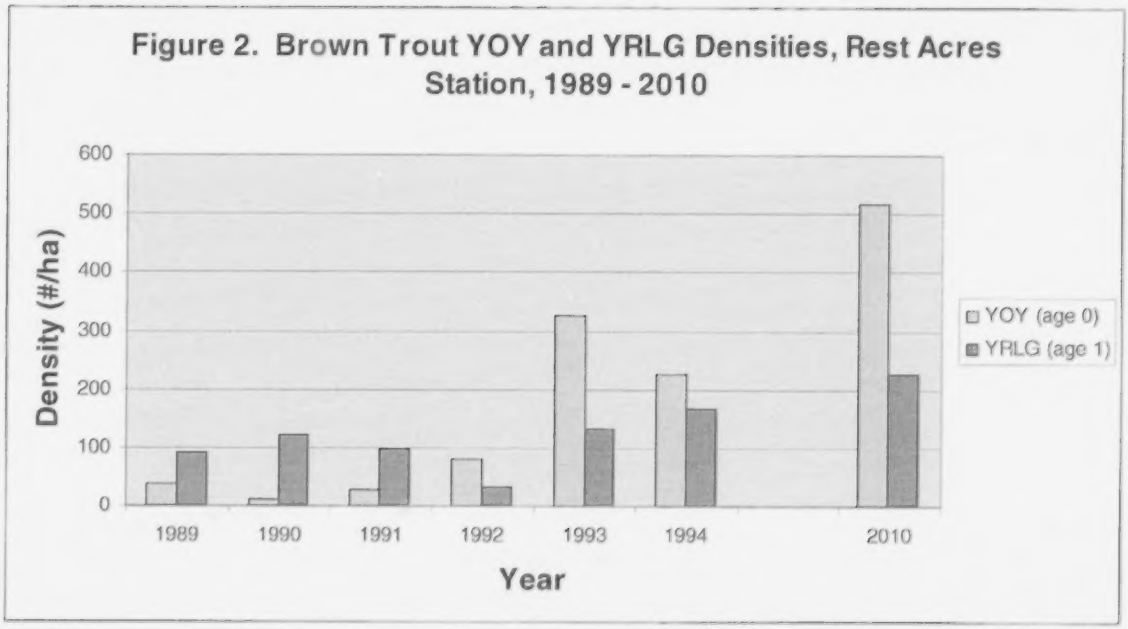


Figure 2. Brown Trout YOY and YRLG Densities, Rest Acres Station, 1989 - 2010
Density (#/ha)
600
500
400
300
200
100
0
1989
1990
1991
1992
1993
1994
2010
Year
YOY (age 0)
YRLG (age 1)

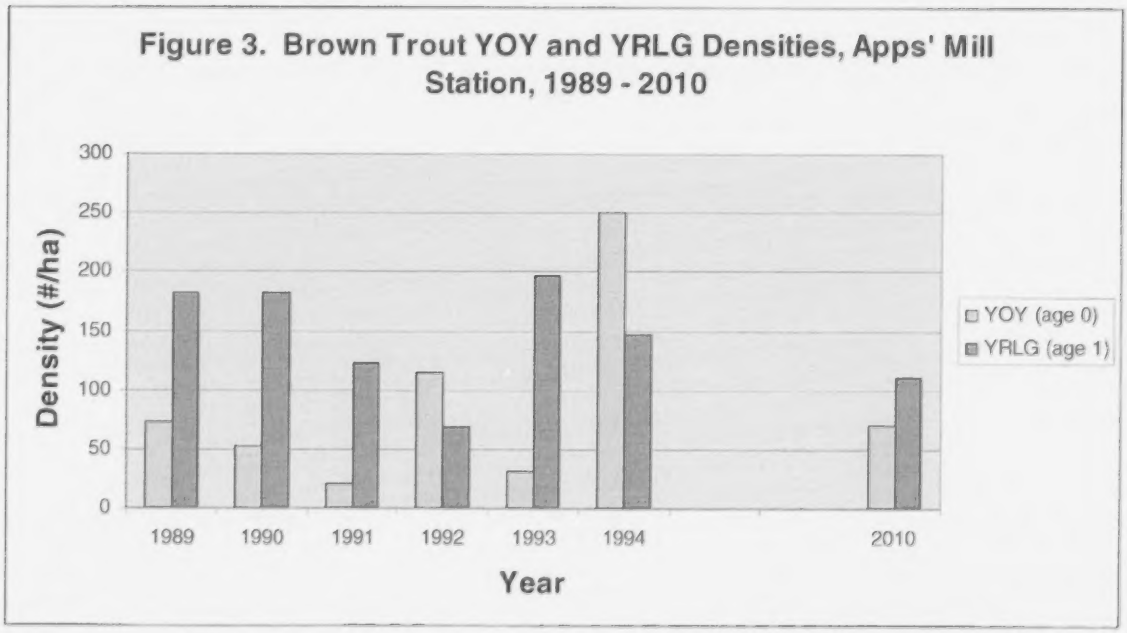


Figure 3. Brown Trout YOY and YRLG Densities, Apps' Mill Station, 1989 - 2010
Density (#/ha)
300
250
200
150
100
50
0
1989
1990
1991
1992
1993
1994
2010
Year
YOY (age 0)
YRLG (age 1)

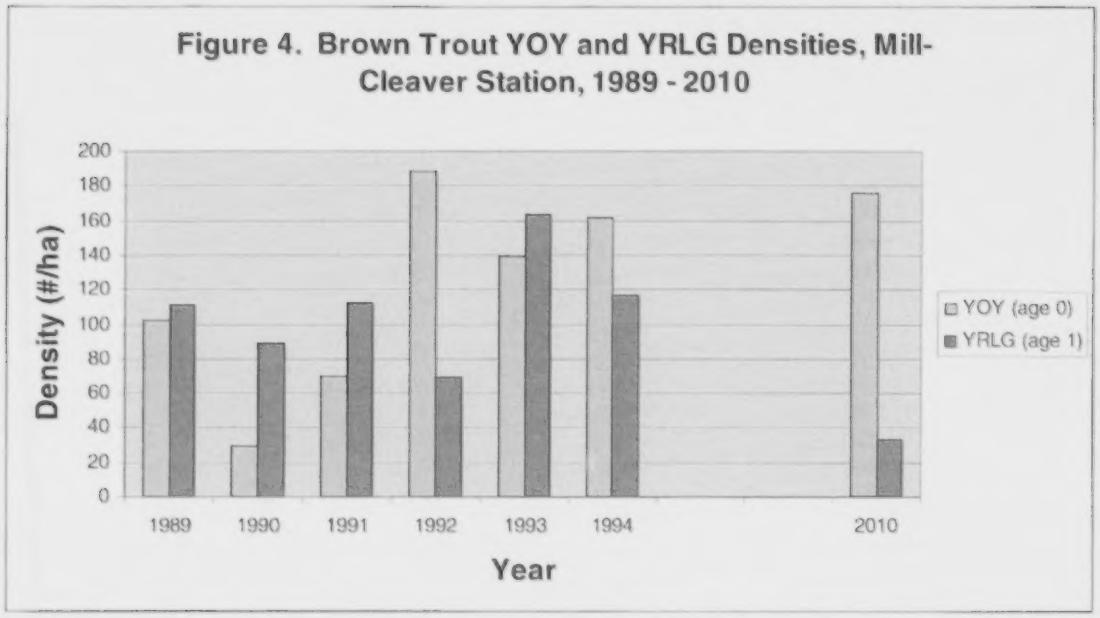


Figure 4. Brown Trout YOY and YRLG Densities, Mill-Cleaver Station, 1989 - 2010
Density (#/ha)
200
180
160
140
120
100
80
60
40
20
0
1989
1990
1991
1992
1993
1994
2010
Year
YOY (age 0)
YRLG (age 1)

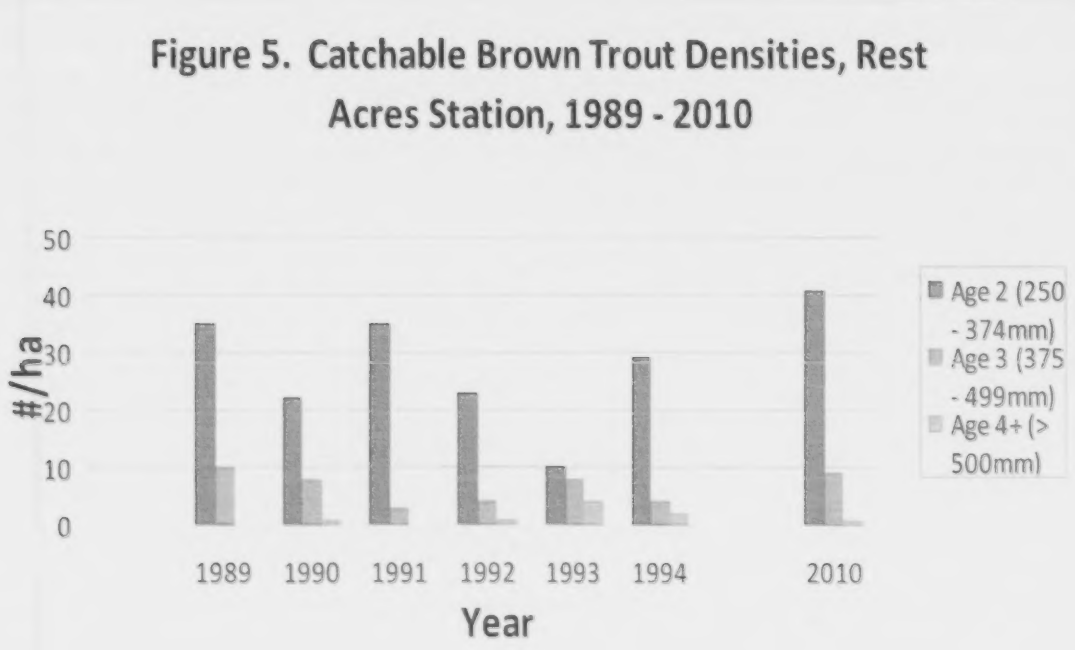


Figure 5. Catchable Brown Trout Densities, Rest Acres Station, 1989 - 2010
#/ha
50
40
30
20
10
0
1989
1990
1991
1992
1993
1994
2010
Year
Age 2 (250 - 374mm)
Age 3 (375 - 499mm)
Age 4+ (> 500mm)

Table 6. Catchable Brown Trout Densities, Apps' Mill Station, 1989 - 2010

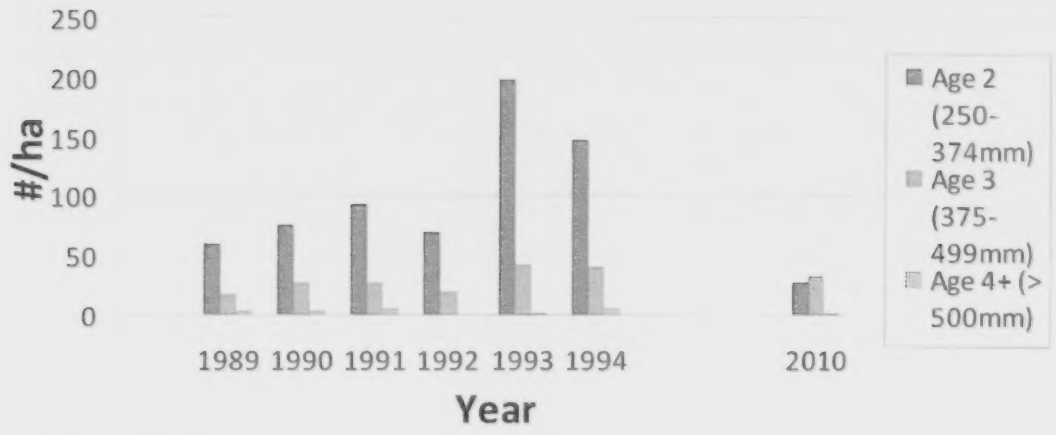
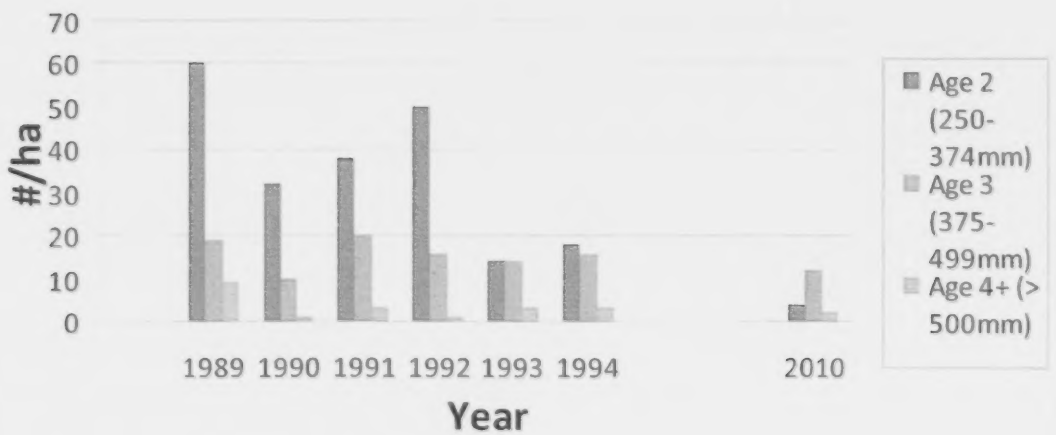


Figure 7. Catchable Brown Trout Densities, Mill-Cleaver Station, 1989 - 2010



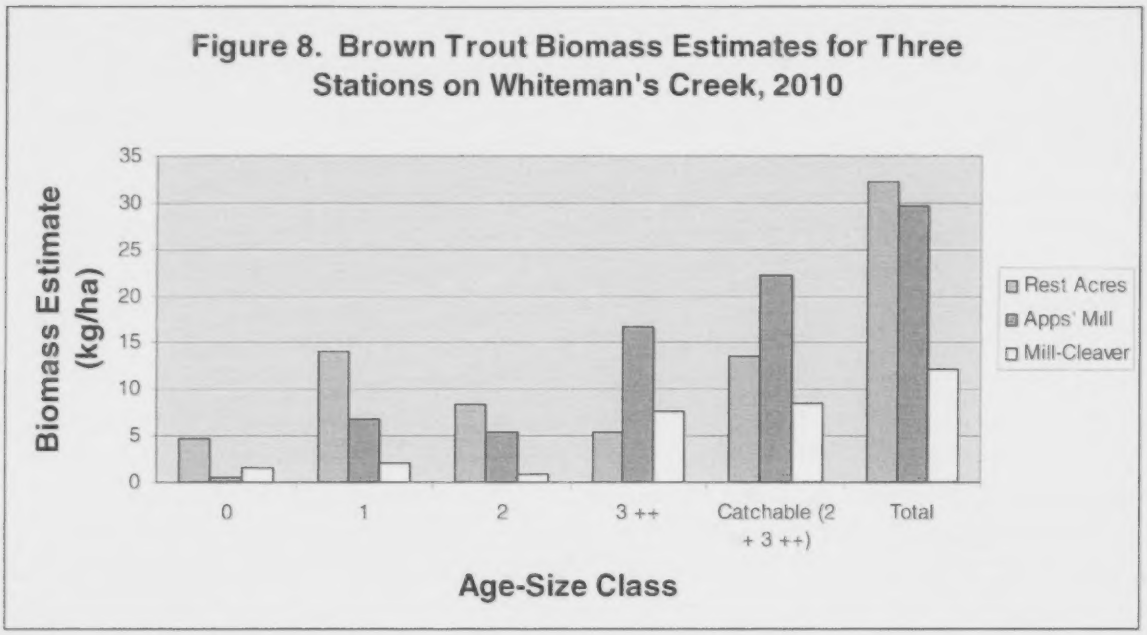


Figure 8. Brown Trout Biomass Estimates for Three Stations on Whiteman's Creek, 2010
Biomass Estimate (kg/ha)
35
30
25
20
15
10
5
0
0
1
2
3 ++
Catchable (2 + 3 ++)
Total
Age-Size Class
Rest Acres
Apps' Mill
Mill-Cleaver

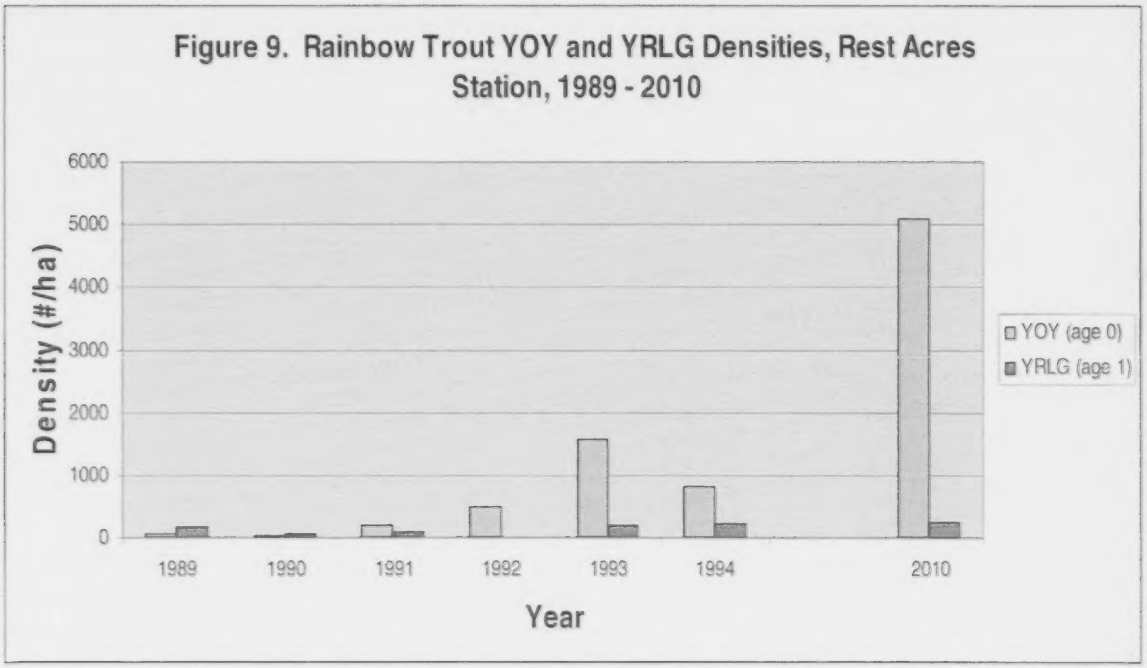


Figure 9. Rainbow Trout YOY and YRLG Densities, Rest Acres Station, 1989 - 2010
Density (#/ha)
6000
5000
4000
3000
2000
1000
0
1989
1990
1991
1992
1993
1994
2010
Year
YOY (age 0)
YRLG (age 1)

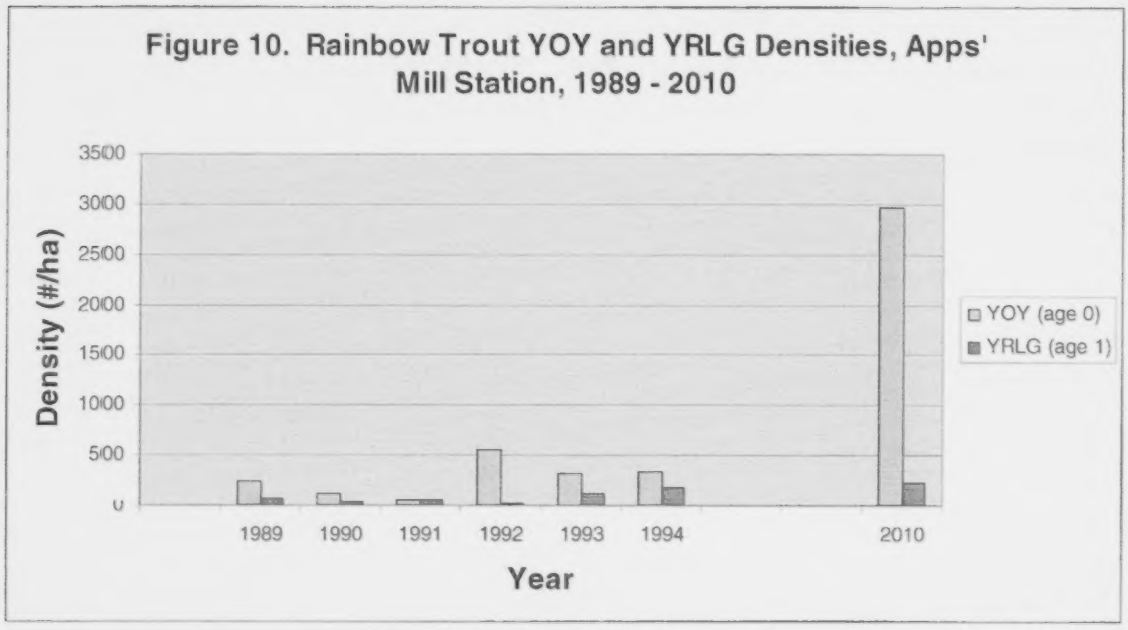


Figure 10. Rainbow Trout YOY and YRLG Densities, Apps' Mill Station, 1989 - 2010
Density (#/ha)
3500
3000
2500
2000
1500
1000
500
0
1989
1990
1991
1992
1993
1994
2010
Year
YOY (age 0)
YRLG (age 1)

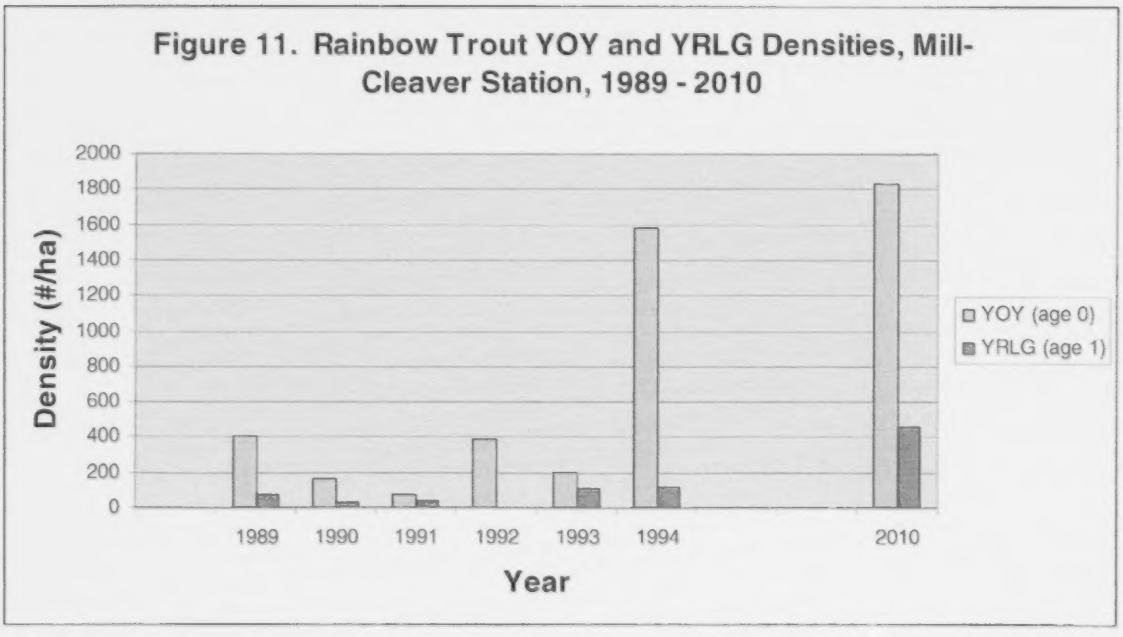


Figure 11. Rainbow Trout YOY and YRLG Densities, Mill-Cleaver Station, 1989 - 2010
Density (#/ha)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1989
1990
1991
1992
1993
1994
2010
Year
YOY (age 0)
YRLG (age 1)

Figure 12. Catchable Rainbow Trout Densisty Estimates, Rest Acres Station, 1989 - 2010

Figure 13. Catchable Rainbow Trout Density Estimates, Apps' Mill Station, 1989 - 2010

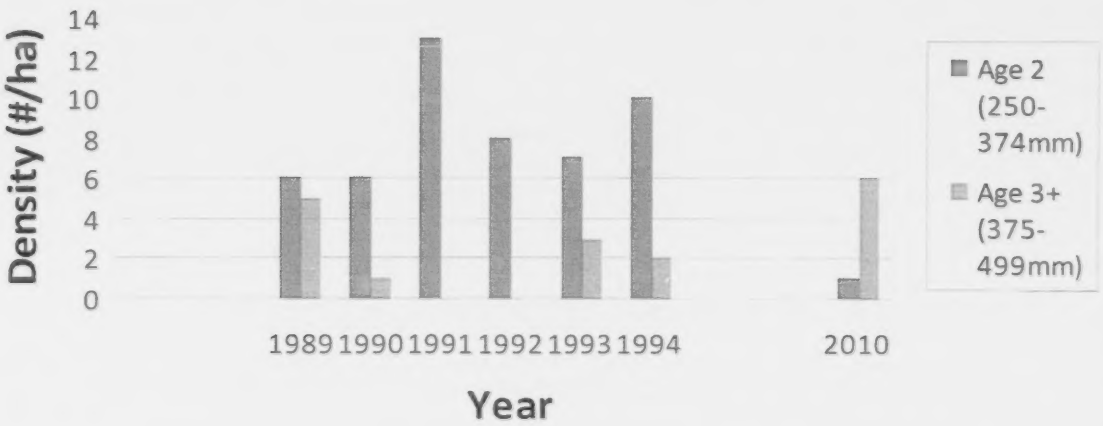


Figure 14. Catchable Rainbow Trout Density Estimates, Mill-Cleaver Station, 1989-2010

Figure 15. Rainbow Trout Biomass Estimates for Three Station on Whiteman's Creek, 2010

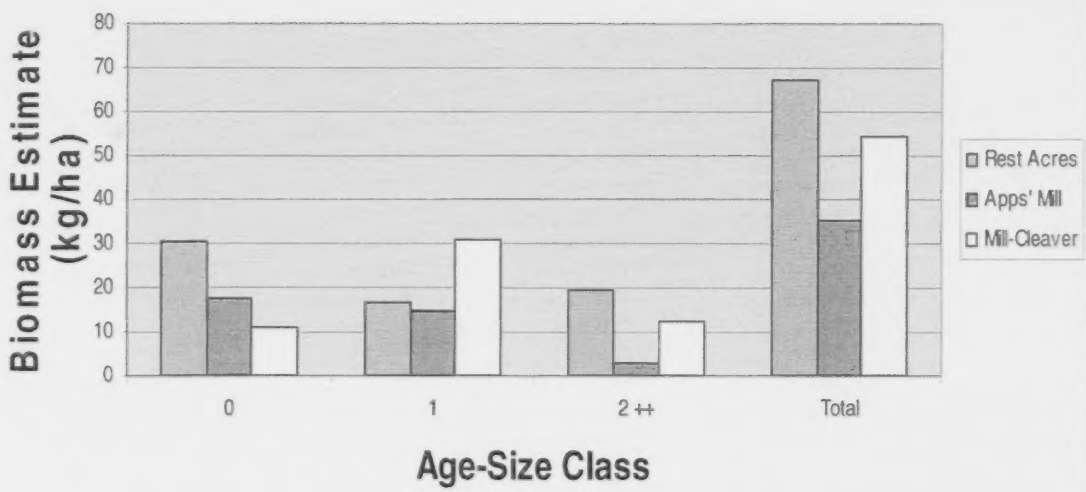


Figure 16. Total YOY Trout Density Estimates (Mean of 3 Stations), Whiteman's Creek, 1989 - 2010

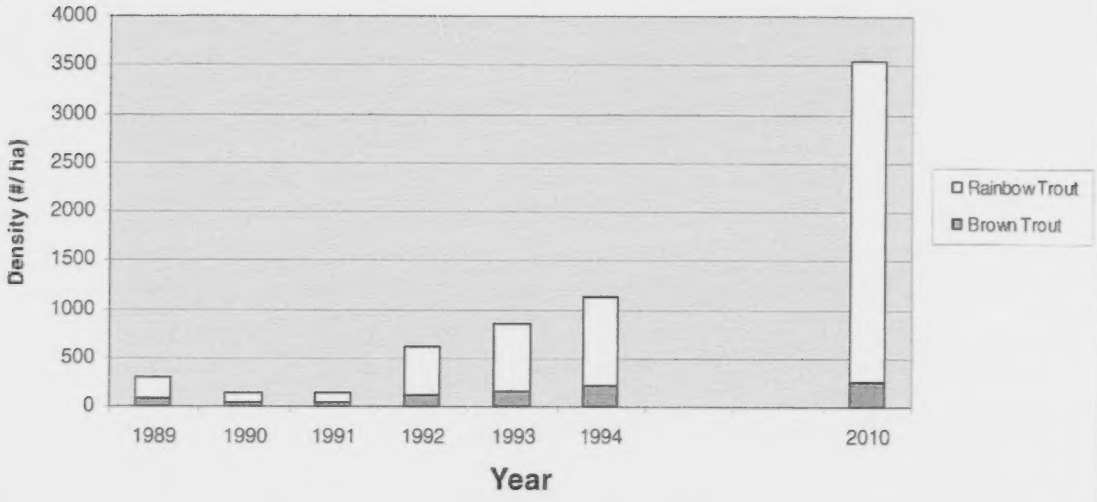


Figure 17. Total Age 1+ Trout Density Estimates (mean of 3 stations), Whiteman's Creek, 1989 - 2010

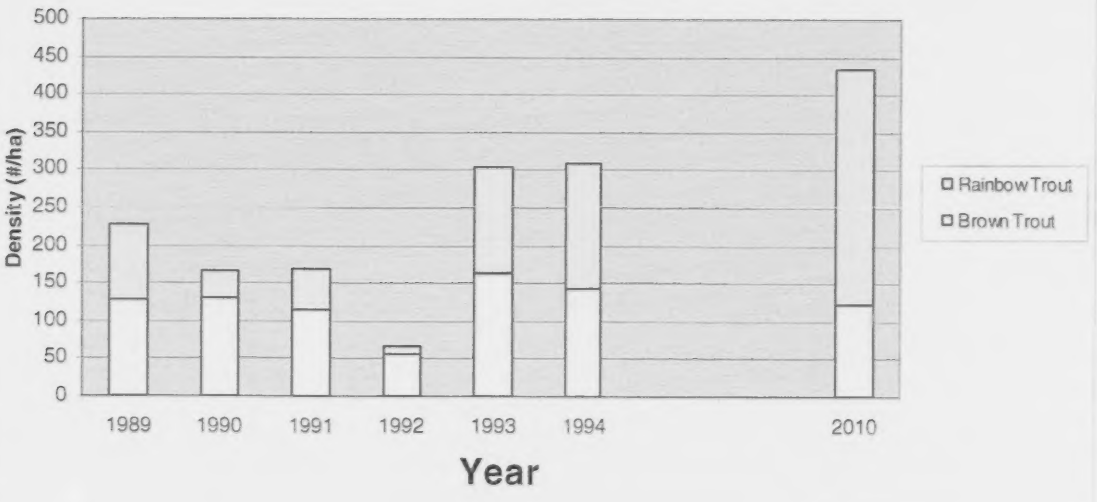


Figure 18. Total "Catchable" Trout Population Estimates (mean of 3 stations), Whiteman's Creek, 1989 - 2010

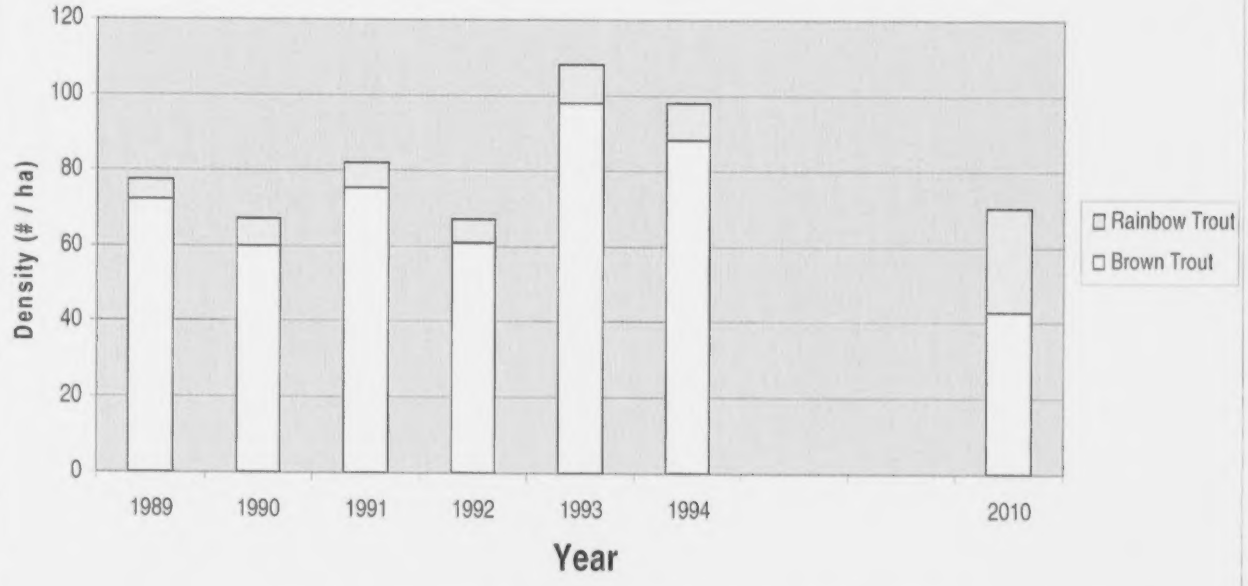


Table 1. Stream discharge, water temperature, electrofishing effort and station population and biomass estimates, 2010.

	Rest Acres	Apps' Mill	Mill - Cleaver
Mark Run			
Date	Aug. 16	Aug. 17	Aug. 18
Discharge (m^3/s)	1 4	1.4	1.3
Water Temperature (^oC)	18.1 - 21.1	18.1 - 20.3	17.9 - 18.9
Total Electroseconds	11324	9066	9531
Recapture Run			
Date	Aug. 24	Aug. 25	Aug. 26
Discharge (m^3/s)	2.1 - 2.2	1.8 - 1.9	1.7
Water Temperature (^oC)	17.8 - 18.6	18.3 - 19.1	17.9 - 18.5
Total Electroseconds	11447	7968	7519
Station Dimensions			
Mid-channel Length (m)	761	745	721
Mean Width (m)	13.3	12.1	13.1
Area (ha)	1.012	0.904	0.941

Table 2. Brown trout age-size classes, Whiteman's Creek, August 16 - 18, 2010.

Age Class	Minimum Length (mm)	Maximum Length (mm)	Mean Length (mm)	N	Minimum Weight (g)	Maximum Weight (g)	Mean Weight (g)	N
0 +	64	123	96	86		16	9	98
1 +	132	221	185	110	24	117	62	105
2 +	227	318	270	50	104	340	202	44
3 +	326	385	359	18	363	601	476	18
4 ++	420	588	462	13	645	2190	1011	15
				277				280

Table 3. Rainbow trout age-size classes, Whiteman's Creek, August 16 - 18, 2010.

Age Class	Minimum Length (mm)	Maximum Length (mm)	Mean Length (mm)	N	Minimum Weight (g)	Maximum Weight (g)	Mean Weight (g)	N
0 +	34	123	84	297		19	6	924
1 +	132	255	187	359	22	165	67	335
2 ++	261	458	353	37	165	1025	429	25
				693				1284

Table 4. Non-trout species captured at Whiteman's Creek population and biomass stations, 2010

Species	Rest Acres	Apps' Mill	Mill - Cleaver
American Brook Lamprey	X	X	X
Northern Pike	2 only	1 only	1 only
White Sucker	most abundant species	most abundant species	most abundant species
Northern Hogsucker	X	X	X
Shorthead Redhorse	1 only	1 only	1 only
Common/Striped Shiner	X	X	X
Blacknose Dace	numerous	numerous	numerous
Longnose Dace	numerous	numerous	numerous
Nocomis sp.	few	few	
Creek Chub	X	X	X
Stonecat	X	X	X
Smallmouth Bass	X	X	
Largemouth Bass	X	X	X
Pumpkinseed	2 only		
Black Crappie	1 only	2 only	
Greenside Darter	X	X	X
Rainbow Darter	numerous	numerous	numerous
Fantail Darter	X	X	X
Blackside Darter	X	X	
Mottled Sculpin		3 only	numerous

Appendix 1. Whiteman's and Landon's Creek Brown Trout Stocking Records

FSIS=Ontario Fish Stocking Information System, GAHSR=Guelph Area Historical Stocking Records

Waterbody Name	Geographic Township	Number Stocked	Age	Stocking Month	Stock	Year	Source of Information
Whiteman's creek		800	unknown		Pennsylvania (probably German brown trout)	1914	Anonymous 1915, Lasenby and Kerr 2001
Whiteman's creek		4,000	Unknown		Unknown	1918	Anonymous 1919
Whiteman's creek		30,000	fry		Loch Leven	1932	Anonymous 1933
Whiteman's creek		5,000	fry		Loch Leven	1933	Anonymous 1934
Whiteman's creek		10,000	fry		Loch Leven	1934	Anonymous 1935
Whiteman's creek		10,000	fry		Loch Leven	1935	Anonymous 1937
Whiteman's creek		5,000	fry		Loch Leven	1936	Anonymous 1938
Whiteman's creek		1,000	y/gs		Loch Leven	1936	Anonymous 1938
Whiteman's creek		1,600	y/gs		Loch Leven	1937	Anonymous 1939
Whiteman's creek		1,000	y/gs		Loch Leven	1938	Anonymous 1940
Whiteman's creek		12,600	y/gs		Loch Leven	1939	Anonymous 1941
Whiteman's creek		10,000	fry		Loch Leven	1940	Anonymous 1942
Whiteman's creek		4,600	y/gs		Loch Leven	1940	Anonymous 1943
Whiteman's creek		?	fry		Loch Leven	1941	Anonymous 1943
Whiteman's creek		?	y/gs		Loch Leven	1941	Anonymous 1943
Whiteman's creek		?	fry		Loch Leven	1942	Anonymous 1944
Whiteman's creek		?	y/gs		Loch Leven	1942	Anonymous 1944
Whiteman's creek		?	y/gs		Loch Leven	1943	Anonymous 1945
Whiteman's creek		?	y/gs		Loch Leven	1944	Anonymous 1946
Whiteman's creek		?	y/gs		Loch Leven	1945	Anonymous 1948
Whiteman's creek	Brantford	2,400	y/gs	08	Loch Leven	1946	FSIS
Whiteman's creek	Brantford	9,000	y/gs	04	Loch Leven	1947	FSIS
Whiteman's creek	Brantford	10,800	y/gs	04	Loch Leven	1948	FSIS
Whiteman's creek	Brantford	1,250	y/gs	05	Loch Leven	1949	FSIS
Whiteman's creek	Brantford	2,500	y/gs	11	Loch Leven	1950	FSIS
Whiteman's creek	Brantford	1,000	y/gs		Loch Leven	1951	GAHSR
Whiteman's creek	Brantford	3,800	y/gs	06	Loch Leven	1952	FSIS
Landon's creek	Burford	800	y/gs		Loch Leven	1953	GAHSR
Whiteman's creek	Brantford	3,600	y/gs		Loch Leven	1953	GAHSR
Whiteman's creek	Brantford	5,000	y/gs	04	Loch Leven	1954	GAHSR, FSIS
Whiteman's creek	Blandford	1,000	y/gs		Loch Leven	1955	GAHSR
Whiteman's creek	Burford	5,000	y/gs		Loch Leven	1955	GAHSR
Whiteman's creek	Blandford	500	y/gs		Loch Leven	1956	GAHSR
Whiteman's creek	Burford	2,400	y/gs		Loch Leven	1956	GAHSR
Whiteman's creek	Brantford	1,200	y/gs	05	Loch Leven	1956	FSIS
Whiteman's creek	Blandford	500	y/gs		Loch Leven	1957	GAHSR
Whiteman's creek	Brantford	2,400	y/gs		Loch Leven	1957	GAHSR
Whiteman's creek	Brantford	2,400	y/gs		Loch Leven	1958	GAHSR, FSIS
Whiteman's creek	Blandford	1,000	y/gs		Loch Leven	1958	GAHSR
Whiteman's creek	Blandford	1,000	16 mo		Loch Leven	1959	GAHSR
Whiteman's creek	Brantford	5,200	y/gs	08	Loch Leven	1959	GAHSR, Dreyer 1960, FSIS
Whiteman's creek	Lot 2 Con 4	400	fry	01	Whitemans/Landons	1975	FSIS
Whiteman's creek	Lot 2 Con 4	500	fry	12	Whitemans/Landons	1975	FSIS
Landon's creek		2,196	fry		Whitemans/Landons	1983	Brant Rod and Gun Club, FSIS
Whiteman's creek		1,835	fry		Whitemans/Landons	1983	Brant Rod and Gun Club, FSIS
Whiteman's creek		7,241	fry		Whitemans/Landons	1984	Brant Rod and Gun Club, FSIS
Landon's creek		2,107	fry		Whitemans/Landons	1984	Brant Rod and Gun Club
Whiteman's creek		8,736	fry		Whitemans/Landons	1985	Brant Rod and Gun Club, FSIS
Landon's creek		3,342	fry		Whitemans/Landons	1985	Brant Rod and Gun Club, FSIS
Whiteman's creek		1,845	fry		Whitemans/Landons	1986	Brant Rod and Gun Club, FSIS
Whiteman's creek		2,536	fry		Whitemans/Landons	1987	Brant Rod and Gun Club, FSIS
Whiteman's creek		115	y/gs		Whitemans/Landons	1989	FSIS
Whiteman's creek		8,000	fry		Whitemans/Landons	1989	Brant Rod and Gun Club, FSIS
Whiteman's creek		9,264	fry		Whitemans/Landons	1990	Brant Rod and Gun Club, FSIS
Landon's creek		5,000	fry		Whitemans/Landons	1990	Brant Rod and Gun Club
Whiteman's creek		6,500	fry		Whitemans	1991	Brant Rod and Gun Club
Whiteman's creek		10,000	fry		Whitemans	1992	Brant Rod and Gun Club
Whiteman's creek		10,000	fry		Whitemans	1993	Brant Rod and Gun Club
Whiteman's creek		10,000	fry		Whitemans	1994	Brant Rod and Gun Club
Whiteman's creek		10,000	fry		Whitemans	1995	Brant Rod and Gun Club
Whiteman's creek		150	fry		Unknown	1996	Brant Rod and Gun Club
Landon's creek		2,900	fry		Landons Creek	1997	Brant Rod and Gun Club
Landon's creek		6,770	fry		Landons Creek	1998	Brant Rod and Gun Club
Landon's creek		1,976	fry		Landons Creek	1999	Brant Rod and Gun Club
Landon's creek		1,800	fry		Landons Creek	2000	Brant Rod and Gun Club
Whiteman's creek		8,650	fry		Whitemans	2000	Brant Rod and Gun Club
Whiteman's creek		6,437	fry		Whitemans	2001	Brant Rod and Gun Club
Landon's creek		1,400	fry		Landons Creek	2001	Brant Rod and Gun Club

Appendix 2. Whiteman's Creek Rainbow Trout Stocking Records
FSIS=Ontario Fish Stocking Information System, GAHSR=Guelph Area Historical Stocking Records.
NMC, CWC and TMNM are fish hatcheries operated by the Ministry of Natural Resources.
SSFC is the Sir Sandford Fleming College fish hatchery.

Waterbody Name	Geographic Township	Number Stocked	Age (months)	Stocking Month	Source	Year	Source of Information
Whiteman's Creek	Brantford	1,000	yrlgs		unknown	1961	GAHSR
Landon's Creek	Brantford	500	12		unknown	1961	FSIS
Landon's Creek	Brantford	500	12		unknown	1963	FSIS
Whiteman's Creek	Brantford	500	17		unknown	1964	GAHSR
Whiteman's Creek	Burford	1,000	12		unknown	1964	GAHSR
Whiteman's Creek	Brantford	7,800	24		unknown	1965	FSIS
Whiteman's Creek	Brantford	10,800	24		unknown	1966	FSIS
Whiteman's Creek	Brantford	6,000	12		unknown	1968	FSIS
Whiteman's Creek	Brantford	9,000	12		unknown	1969	FSIS
Landon's Creek	Brantford	500	19		unknown	1969	FSIS
Whiteman's Creek	Brantford	1,600	24		unknown	1970	FSIS
Whiteman's Creek	Brantford	4,800	12		unknown	1970	FSIS
Whiteman's Creek	Brantford	4,000	24		NMC	1971	FSIS
Whiteman's Creek	Brantford	9,500	12		NMC	1971	FSIS
Whiteman's Creek	Brantford	8,000	18		CWC	1972	FSIS
Whiteman's Creek	Brantford	10,500	19		NMC	1973	FSIS
Whiteman's creek	?	1,200	32	08	TMNM	1975	FSIS
Whiteman's creek	lot 7 con 4 Brantford	750	51	05	TMNM	1975	FSIS
Whiteman's creek	?	85	52	03	NMC	1978	FSIS
Whiteman's creek	?	52	52	12	TMNM	1978	FSIS
Whiteman's creek	near Alp's Mill	3,000	try		SSFC	1979	GAHSR FSIS
Whiteman's creek	Brantford	4,500	fglg		SSFC	1980	GAHSR FSIS
Whiteman's creek	?	720	?	02	unknown	1981	GAHSR